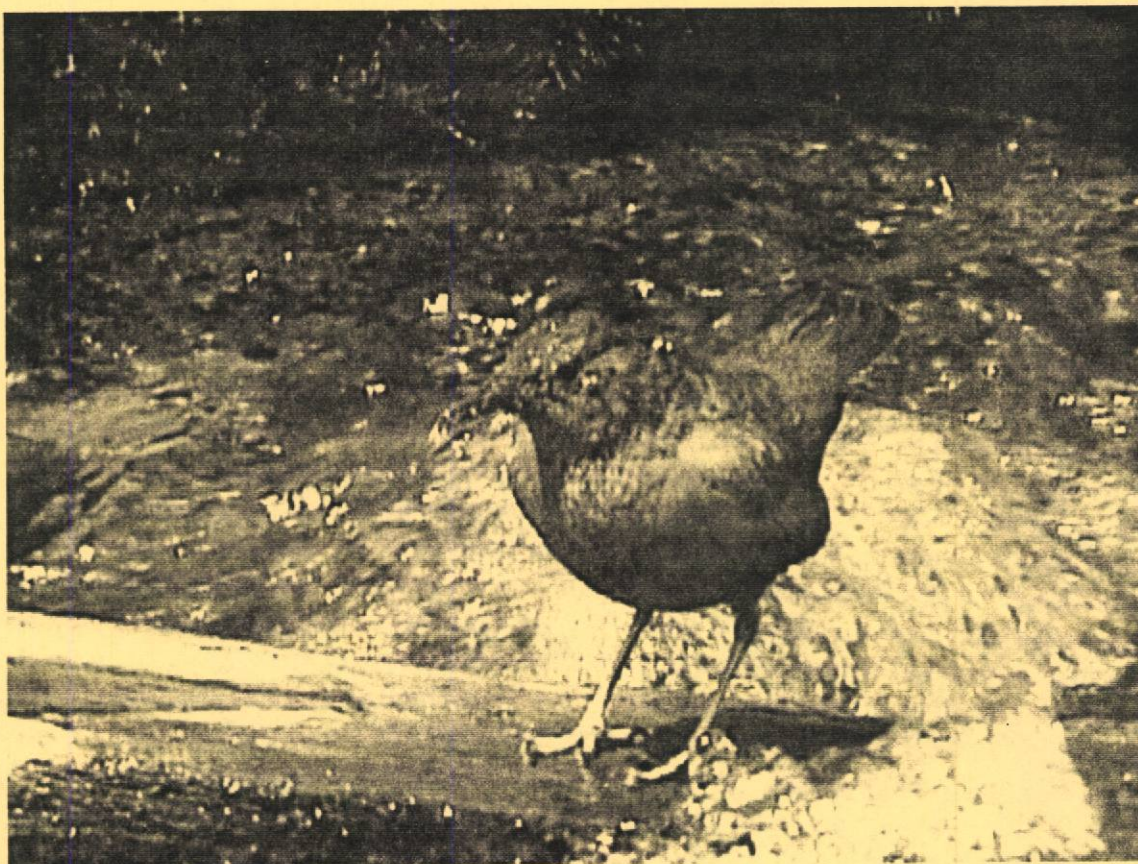


**Summer 2001 Survey of the Status of the
American Dipper (*Cinclus mexicanus*) on its
Historic Range in the Black Hills, South Dakota**



**Report for the South Dakota Natural Heritage Program
SD Department of Game, Fish and Parks
by
Rosemary Draeger and Linda Johnson**

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Introduction

The American Dipper (*Cinclus mexicanus*) is described in *The Birds of North America* No. 229 as North America's only truly aquatic passerine (songbird). The author also notes that dippers choose "a nest site, invariably along a stream, that provides security from floods and predators. Availability of suitable nest sites appears to limit its populations and is probably the principal limiting factor" (Kingery, 1996).

This intriguing bird, which lives in and on fast-flowing mountain streams in certain mountain ranges of western U.S. and Canada, is most often observed in South Dakota at Roughlock Falls in Spearfish Canyon. The dipper was placed on the South Dakota threatened species list by the state's Department of Game, Fish and Parks in 1996. Periodic surveys conducted from 1993 through 2000 indicated that Dippers are declining in number and may now be relegated to the Spearfish Creek drainage, including Spearfish Creek and just four of its tributaries, flowing out of the northern Black Hills.

It appears that the Black Hills population of dippers is isolated, with little or no chance of rejuvenating itself through dippers migrating from outside the Hills. Dippers do not appear to be able to migrate across expanses of prairie; movement is always along waterways or short distances across divides to adjacent waterways. Streams and rivers surrounding the Black Hills do not support dipper habitat. The nearest viable population is in the Bighorn Mountains, 120 miles to the west (Backlund).

In the Black Hills, active nests have not been found in recent years in areas which once supported good numbers of dippers, notably French and Rapid Creeks. The dipper has not been reported on the Rapid City Christmas Bird Count (CBC) since 1984. Yet, prior to that it was found on about 50 percent of Rapid City's CBC's. However, the count of dippers on Spearfish Creek in 1998 and again in March, 2001 showed a surprising increase from prior years.

The primary purpose of this survey was to answer the question: Is the American Dipper expanding its range in the Black Hills? The survey was designed to ascertain whether dippers or their nests could be found on their historic range. The historic range includes five creeks where their presence had been noted in the past, but where the species has not been reported for more than five years: Bear Butte, Elk, Boxelder, Rapid and French Creeks. Additionally, we surveyed Squaw, Little Elk, Spring and Grace Coolidge Creeks. While dippers have not been reported recently on these creeks, many of the creeks provide good habitat for dipper nesting: fast-flowing, clear, unpolluted streams with noisy riffles and waterfalls, emergent perching rocks, and large rock outcroppings or cliffs overhanging the water (Price and Bock 1983, Tyler and Osmerod 1984, and Osborn 1999).

One objective in this survey was to observe and record the locations of any dippers and any active or old nests, as well as the specific habitat and stream conditions at each location. An additional objective was to observe and record specific locations along transects of potential dipper nest sites determined by habitat and stream conditions. The

survey was conducted to contribute to the South Dakota Natural Heritage Database. Additionally, the survey provides the South Dakota Department of Game, Fish and Parks potential locations for artificial nest boxes. We also hope the survey provides increased awareness of the fragile status of dippers in South Dakota and the impetus for action to improve conditions that will permit dippers to thrive.

Methods

Over two days in May, 2001, we surveyed the dipper population on Spearfish Creek, accompanying state biologist Doug Backlund on his Spearfish Creek dipper survey route. This survey resulted in the highest number of dippers and active nests on Spearfish Creek since he began his survey in 1993, furthering interest in determining if dippers are reestablishing their species in their historic range.

From July 3 through July 21, 2001, we gathered field data. We surveyed for dippers, nests, and potential nesting habitat on as much of each creek as we could reach by driving along the stream or hiking in the stream, and we specifically surveyed sites where dippers have been reported in the past.

All creeks had sections inaccessible due to one or two factors: no public access and non-scalable rock/cliff formations over or beside streams.

We anticipated that water volume and high flows would also prevent some access, but, perhaps because flows are lower during the summer, this did not pose a significant problem on our transects.

Because dippers live right on and over streams, we included in our surveyed transects only those sections of streams where we could actually see the water's edges, watch for flights, and listen for calls of flying dippers as we progressed up or down stream. Additionally, because dippers often build easily-identifiable nests in very specific locations along streams, we sought out and closely examined many potential sites for signs of nests.

At each location where a nest was found and at all locations with seemingly good nesting habitat despite no nest found, we recorded global positioning coordinates and the size, scope, or degree of specific habitat elements shown by research (Osborn 1999, Tyler and Ormerod) to be important for successful habitation by dippers:

- stream characteristics of flow speed, substrate composition (gravel, rubble, submerged rocks, perching rocks, woody debris), water width and depth;
- presence or absence of invertebrates (common dipper food) on submerged rocks;
- nest characteristic providing an inaccessible ledge over water (primarily cliffs, rock outcroppings, massive boulders, or bridges);
- density of stream-side vegetation for cover; type of human use of adjacent stream-side land.

We created a Data Sheet to record field data at each GPS location based on an adaptation of definitions found in Osborn, 1999. The Data Sheet in Appendix B categorizes stream characteristics including width and depth measured in meters. Flow speed was rated by number into 5 categories: pools (1), glides(2), riffles(3), white water(4), and raging white water with chutes(5). Next we recorded substrate details such as streambed material, presence of perching boulders, downfalls, and density of streamside cover. The presence or absence of food was measured by checking for aquatic invertebrates under rocks. Next nest sites were noted by availability and type. Finally, we also recorded the type of human development along the stream: housing, agriculture, roads, grazing, or natural.

The information from the Data Sheet has been summarized in the maps and tables in Appendix A. Maps were constructed from National Geographic Trails Illustrated maps of the Black Hills.

Summary of Results

A single dipper (possibly two) was found on Bear Butte Creek, and nests were found on Rapid at Thunderhead Falls, on Squaw (tributary of Spearfish Creek), and on Bear Butte Creeks.

Dippers were not found on Elk, Little Elk, Boxelder, Rapid, Spring*, Grace Coolidge, or French Creeks. The survey shows that the American Dipper has apparently not returned to these creeks, in spite of the presence of habitat with physical characteristics such as cliffs, rock ledges, boulders, rubble, and extensive streamside cover, which dippers prefer. It is possible that water quality on many of these creeks has been degraded and now prevents dippers from being reestablished. Human development in the Black Hills appears to have also degraded suitable nesting and foraging habitat.

* In November 2001, two dippers were observed on Spring Creek. See the Spring Creek discussion.

Results

Results of our survey are detailed in the narrative, tables, and maps. Maps and tables show specific locations (GPS coordinates) of dipper sightings, nests, and potential nest sites, good foraging habitat, and locations where dippers had been sighted in the past. In addition to those features, the narrative also discusses transects where no dipper habitat was found, dry creek sections, and inaccessible areas. Our survey results lead to several questions, which are discussed at the end of the report.

Bear Butte Creek

Galena Road

On July 5 and July 8 we surveyed Bear Butte Creek by driving along Highway 385 to the Galena campground and Highway 534, and by hiking from N 44°20.218' W103° 37.274' to N44° 20.376' W103°37.041' on forest service land, the only section of the creek where we found suitable habitat and two dipper nests (Map 1, Table 1). We are not aware of any previous records of dippers on Bear Butte Creek. Hays reported in June, 1997 that a survey of the creek along Highway 385 to Galena produced no signs of dippers or nests. We have no record of whether more rugged eastern sections of the creek have ever been surveyed.

The creek along Highway 534 meanders through open meadows and some pine. These areas are not suitable dipper nesting habitat. In addition, much of the creek to the west is on private land and therefore inaccessible.

The creek varied from approximately 2 meters by the gravel road east from the Galena campground, and 7 meters at falls along the Galena road to 8 meters further downstream on wilder sections on Forest Service land. Depth in the more rugged sections was approximately .2 to .4 meters.

Forest Service Road #170

In the less accessible sections on forest service land, the creek had many riffles, perching rocks and submerged rocks, heavy streamside cover, and much downfall and debris.

A nest was located at a limestone cliff overhang on a ledge 1.2 meters above the stream (1.5 above stream bed) N44°20.218' W103°37.274'. The nest had been broken through, and no nest lining was present on the inside base. Fecal sacs were present beside the nest. We observed whitewash on the nearby perching rocks and larval forms of invertebrates on the underside of rocks.

Downstream from nest #1, were several other suitable nest sites, including cliff overhangs and a large boulder midstream. The stream along this section had many

riffles, rubble and submerged rocks. Worms and larval sacs were present under rocks. In this section streamside cover is heavy.

At N44°20.376' W103°37.041' (2.6 GPS miles upstream from the nest site #1) was a second nest 1.83 meters above the water surface on a cliff overhang. A pool under the nest was .4 meters deep, 8 meters wide, very silted and muddy, making it difficult to walk in the pool. Numerous perching boulders and many riffles were available on either side of the nest area, both up and downstream. Streamside cover was heavy, and woody downfall numerous.

As we checked the nest, an adult dipper flew toward us, perhaps agitated by our presence near the nest. It flew past us twice, traveling upstream over water, calling. Downstream the water volume decreases. Although we did not walk the section of creek beyond the nest, the creek was dry further east. Many creeks in the Hills disappear underground at the Madison formation during low flow seasons and remerge later, revitalized by artesian springs (Hortness and Driscoll 1998).

Bear Butte was the only creek on which we observed dippers. Bear Butte had suitable habitat (particularly beyond the developed, private areas) with numerous submerged rocks, riffles, woody downfall, heavy streamside cover, and abundant aquatic invertebrates.

Headwaters of the creek are within five miles of the Spearfish Creek drainage area (Map 8, Dispersal Zone). Is it possible that dippers from Spearfish Creek and its tributaries are dispersing into Bear Butte? An additional question is whether dippers can travel through areas of the stream degraded by human interference to less developed sections.

Elk Creek and Little Elk Creek

Historically, dippers may have been sighted on Elk Creek (a single dipper was reported by the ornithologist on Custer's expedition in 1874); however, none have been recorded in recent years. Hays surveyed the creek on June 1996, found no dippers or evidence of nests, and reported a "heavy silt load and turbid water."

We surveyed Elk Creek by hiking along a section on forest service land to private land (Map 2, Table 2). A few marginal nest sites were located. At N44°17.882' W103°34.903' was a potential nest site at a very large boulder next to a cliff face with vegetation in front. Water width at the spot was 4 meters wide and 1 meter deep. The stream had submerged rocks, a few perching boulders and moderate streamside cover. Invertebrates were abundant on the underside of rocks. Upstream were riffles, submerged rocks, sparse to no downfall, and a rough trail alongside the creek. The area downstream from the boulder appears to be excellent foraging. At the edge of forest service land (N44°17.935' and W103°34.424') was another good nest site on a cliff overhanging a pool. Water on either side of the pool was 5 meters across and .2 meters deep at the stream center. There were riffles both up and downstream, some standing waves, and a bit of whitewash.

Owners of property near this creek section indicated that they had seen a dipper in early summer 2001 at the very large boulder just downstream.

Near Bethlehem Cave, and hiking the Centennial Trail from FSR #168 off Vanocker, we found only a dry creekbed for several hundred yards in both directions (N44°17.893 W103°31.485'). Dry creek begins along Vanocker Road and runs for several miles. We also drove an unmarked road approximately a mile north of Piedmont up through Elk Canyon to the Dalton Trailhead. The creek along the road was slow moving, meandering through meadow, and often just a trickle. No suitable dipper habitat was found.

Sections of both Elk and Little Elk that we surveyed were poor dipper nesting or foraging habitat. Additionally, much of Little Elk runs along private farm and ranchland and is inaccessible. According to US Geological Survey hydrologist Joyce Williamson, Little Elk may be completely dry in drought years (personal communication, August, 2001) and would therefore not be suitable dipper habitat.

Boxelder Creek

We surveyed Boxelder Creek on July 7 (Map 3, Table 3). At bridges, potential nesting box sites, the water was 6 meters across, .2 meters deep with riffles, rubble, some mud and silt under the bridge. Numerous perching boulders were present, and there was zero downfall and sparse streamside cover. The gravel road was heavily traveled in a highly developed area.

Box Elder Forks

At N44°11.682' W103°31.302' was possible foraging habitat with rubble, good riffles, many perching rocks, and woody downfall. However, there was some silt on the edges. Some aquatic invertebrates were present.

At N44°11.551' W103°31.089' similar habitat was found. At this spot there was some downfall up and downstream from the bridge, moderate streamside cover and some worms and other invertebrates under rocks. Glides, riffles, rubble, submerged rocks, some silt and numerous sharp perching boulders were present. Very little food was present (not as abundant as that on Bear Butte Creek, for instance).

Steamboat Rock Area

On July 11 we hiked upstream from Steamboat Rock, a tourist stop/swimming hole with a hiking trail (N44°09.530' W103°28.22' Map 3, Table 3). The stream varied from 6 meters across and .25 meters deep to 9 meters across and 1.5 meters deep. At a narrow waterfall was a pool. The substrate was sand and gravel with few perching boulders, 1 or 2 woody downfalls, tall grassy banks, and some invertebrates. Upstream was a private

cabin, and the stream flowed into an open meadow and further development. Foam was present in several places and floating downstream.

Boxelder meandered through meadows in several places, had marshy edges with some rocky outcrops and a few widely separated riffle areas. No emergent rocks were located, and the only perching boulders were at small waterfalls. Downstream from Steamboat Rock, the creek traveled through residential hobby ranch area with horses having access to the creek. Some apparent good habitat along the outcrops was not approachable because it is on private land. A survey of these areas would require collaboration with owners.

As Hays noted in his 1998 survey of Boxelder, "turbidity and high silt load in Boxelder Creek continues to degrade dipper habitat on that stream."

Rapid Creek

We surveyed Rapid Creek from Rhoads Fork west of Black Fox campground to parts of Dark Canyon just west of Rapid City July 7 and July 10 through 13 (Map 4, Table 4).

Rhoads Fork to Rochford

We drove FSR #233 from Rochford to Rhoads Spring on Rhoads Fork of Rapid Creek. The narrative describes the stream west to east, downstream (Map 4A, Table 4).

The stream had few perching boulders, little woody downfall and moderate streamside cover. The stream had rubble and some riffles, but we did not locate any food under rocks. We noted silting and muddy edges and some gravel (a heavy rain the day before may have contributed to the turbid water). The stream width varied from 3 meters at Rhoads Spring and .2 meters deep to 6 meters wide and .2 meters deep near Rochford.

From Rhoads Spring, downstream through two beaver ponds to Black Fox, the stream meandered through several miles of open meadow. We surveyed the creek upstream from the ponds because of a report that a dipper had been a regular summer resident. Water near the spring (N44°07.878' W103°52.093') had intermittent riffles, gravel, no perching boulders or downfall and moderate streamside cover--primarily deciduous (willow and other riparian shrubs), with ponderosa pine forest surrounding the area. No invertebrates were present, but there was moss and other vegetation in several places. While the habitat near the springs is uncharacteristic for dipper nesting, the icy clear water and presence of beaver ponds indicates potential summer foraging habitat.

Mickelson Trail from Rochford to Silver City

Along the Mickelson Trail from the Rochford intersection to the railroad tunnel (N44°06'243' W103°38.486'), the creek width varied from 6 meters wide and .2 to .5 meters in depth (Map 4B, Table 4, Sites #3-5). Sections of the stream contained many riffles,

submerged rocks, streamside perching boulders, and heavy streamside cover. There are several spots with cliff faces, bridges and small waterfalls.

At N44°06.418' W103°38.949' was a trail stop/bench at waterfalls, accessible to humans. Water at the edge was .5 meters deep, 8 to 9 meters across. The pool at the falls was muddy and silted, with gravel substrate and foam on both sides. Rocks showed scarce food present (worms, invertebrates on a few rocks). This may be caused by the high slate composition of the streambed (Dr. Scott Kenner, personal communication, August, 2001).

Near the railroad tunnel at N44°06.243' W103°38.486' the stream width was 6 meters across, .2 meters deep with rubble, submerged rocks, good riffles, and heavy streamside cover.

On July 7, we surveyed the Deerfield Trail section of the creek (N44°04.886' W103°35.280'). Water in that section of the creek was 6 meters across, .2 meters deep with riffles, some white water, rubble and submerged rocks, few perching boulders or downfall, moderate streamside cover. Heavy hiking traffic from the Silver City trailhead may diminish the suitability of dipper habitat. The creek does not have potential nesting sites; however, we were unable to check farther upstream due to a hailstorm.

In general, while Rapid Creek from Rhoads Spring to Silver City has some marginal nest sites, the presence of trails and heavy human traffic with accessibility to the creek makes this a highly disturbed habitat, unsuitable for dippers.

Rapid Creek Below Pactola: Placerville, Johnson Siding

Hays surveyed Rapid Creek below Pactola in 1996 and 1997, including Thunderhead Falls downstream through Hisega to Dark Canyon and Johnson Siding to Big Bend and reported no dippers or evidence of nests (Map 4C).

On July 12, we hiked the Centennial Trail spur at Placerville Camp east of Pactola Reservoir. Potential nest sites along the spur included two places where old bridge pilings create small waterfalls with overhangs and moss, and a few cliff faces with crevices (Map 4C, site #6-9).

At N44°04.640' W103°28.306' the spur trail ends in a ledge. Waterfall over rubble and old bridge pilings appeared to be a 1 meter drop with moss and spaces behind the pilings suitable for a nest. We estimated the width of the stream as 15 meters, narrowing to 12 meters downstream. The waterfall had raging white water chutes, rubble, submerged rocks but no perching boulders. Glides and riffles occurred up and downstream. Streamside cover was moderate with some woody downfall (grassy with the pine forest several meters back from the bank). We also observed a muskrat in the area.

A smaller waterfall over more bridge pilings downstream (N44°04.715' W103°28.197') had similar habitat—glides above the falls with riffles, rubble and icy, clear water below.

A rough trail crossed the water in several places, so the area was somewhat accessible to humans. Water in the stream was approximately 1 meter deep, fast-flowing with a gravel and rubble substrate, no perching boulders or downfall and moderate streamside cover. Many bugs were present, and the water was icy and clear.

At N44°04.670' W103° 28.040' the trail crossed the water at a cliff face with ledge and crevices above a pool (Table 4, Site #7). Downstream from the pool, the stream was approximately 12 meters across and .5 meters deep. There were riffles, water with some small standing waves upstream, and very strong current. Rubble, submerged rocks and perching rocks at the edges were present. There was zero woody downfall and moderate streamside cover.

At Johnson Siding off Highway 44 (N44°04.828' W103°26.360') we surveyed an area which had excellent physical habitat: a sheer slate cliff, several rock outcroppings upstream and downstream, and bridges (Table 4, Site #9). Hays surveyed the area in 1996 and 1997, noting the high water those years and stating that "No birds or signs of nesting were found."

The slate cliff had many crevices; however, the pool beneath the cliff and the stream was too deep and fast to be accessible. Water downstream from this location near a bridge was 8 meters across and .5 meters at the edge. Current was very strong, water clear and icy. Silt was clinging to instream rocks in many places. Streamside cover varied from moderate to sparse (lawns for upscale homes). At the bridge downstream from the cliff, the creek was 12 meters across and .2 to .5 meters deep with strong current, riffles, rubble, submerged rocks, some perching boulders, sparse streamside cover and silt on the submerged rocks. There were bugs on some rocks, but most rocks we checked were absent any food.

While the physical features of this area (cliff crevices, rock outcroppings, depth, fast-flowing, icy conditions of the stream) indicate potentially suitable nest sites, the human development may be negatively impacting dipper-friendly habitat.

Thunderhead Falls and Hisega

On July 11 we surveyed the bridges leading to Thunderhead Falls (at N44°03.309' W103° 25.042' and N44°03.539' W103°24.862') near the Salvation Army camp (Map 4D, Table 4, Sites #10-12). Earlier in 2001, a dipper nest was reported at one of these bridges. On the second bridge we found an empty nest box with no sign of use; no natural nests were located. The stream at this point was 8 meters across and .6 meters deep. It was fast-flowing and icy with many riffles, white water, rubble, submerged rocks and few perching boulders. Streamside cover was heavy (mixed), with few woody downfalls. Aquatic invertebrates were present on rocks we overturned. Near the bridge was a rock outcropping/cliff with many overhanging ledges. While this section of the creek has many potentially good natural nest sites and several bridges, the area also has

much private land, many residences, and a paved road. The road terminates at a church camp and Thunderhead Falls, a highly commercial tourist attraction.

Two old dipper nests were located 15 meters inside Thunderhead Falls cave. As many as four nests at a time have been seen at the spot, according to Helen Gourley, 25-year employee at Thunderhead Falls (July 2001). The cave walls are across from a tourist walkway and highly accessible to disturbance. The falls outside the cave drop approximately 9 meters into a pool, which is 10 meters across. Dippers and fledglings have been seen regularly for the past 20 years "flying in and out" of the outside falls. Depth at the riffles further downstream was .2 meters. Rubble, a few perching boulders and vegetation were present. Insects and small fish were also observed in the stream. Further downstream the creek flows along canyon cliffs on private land.

On July 12 we surveyed at Hisega, a private development downstream from Thunderhead Falls. Bridges at N44° 03.291' W103° 24.299' and N44°03.154' W103°24.107' were 11 meters across. Water near the bridges was .5 meters deep. The stream had a cliff along one side, as well as submerged rocks, few perching boulders at the edges, some white water, very little downfall and deciduous, heavy streamside cover. A little vegetation was observed in the stream and some bugs were present on rocks we checked. Contacts with area residents might provide potential nest box sites and monitoring.

Dark Canyon

On July 13 we drove Falling Rock Road and Forest Service Road # 597 and hiked a rough trail into Dark Canyon and the best dipper nesting habitat we located. The secluded, deep canyon was accessible approximately two to three miles along the overgrown, unmaintained forest road (Map 4D, Table 4, Sites #13-16).

At N44°02.794' W103°22.392' the creek makes an "s" turn at a bridge next to a cliff face. The forest service road crosses an old bridge (12 meters water width). Depth at edges was .5 meters; the stream had white water and chutes, many submerged rocks and numerous perching boulders, larvae. We located an empty dipper box on the north side of the bridge, facing south. Streamside cover was moderate, primarily deciduous. We found larvae under submerged rocks.

At N44°02.713' W103° 22.172' the water was 15 meters across with riffles, standing waves, and white water. There were numerous boulders and riffles in shallower areas throughout the entire length of stream. We found larvae present under submerged rocks, and the water was fast-flowing and icy cold. Kingfishers were also observed in this area.

The entire canyon area we walked had rubble, submerged rocks, numerous perching boulders, zero downfall and heavy deciduous streamside cover with ponderosa forest surrounding. Potential nest sites included large boulders, cliff overhangs and crevices, as well as forest service bridges. The canyon is very secluded, is prime dipper nesting habitat, and yet, we saw no evidence of dippers.

The section of Rapid Creek from Placerville through Thunderhead Falls and into Dark Canyon is prime dipper habitat, which could support a dipper population if a large enough section of creek up and downstream can be aggressively managed. According to Dr. Scott Kenner at the South Dakota School of Mines, the best caddis population on Rapid Creek is just upstream from Canyon Lake.

French Creek

Horsecamp and Downstream

We hiked French Creek on July 17 from the horse camp to N43°43.613' W103°26.279' along the hiking/horse trail (Map 5, Table 5).

The creek varied from an average of 6 meters wide on the west, closer to the camp, to 3 meters further downstream. Water depth was .3 to 1.5 meters. The stream had glides, some riffles, submerged rocks with few perching boulders, sparse streamside cover and mud and silt at the edges. Very few bugs were present at the first GPS marking. Grass and poison ivy were abundant all along the creek.

Potential nesting sites at rock outcroppings included several identified on Table 5, Sites #1-3. A typical site was N43°43.634' W103°26.380' (a cliff with crevices and a pool with glides). Upstream and down were submerged rocks, riffles, sparse streamside cover, often marshy. Water was about 5 meters bank to bank and .3 meters deep at the edges.

Placid pools and noisy riffles occurred up and downstream from these sites, and some food was present (vegetation in stream and invertebrates under rocks). However, foam/suds was observed in several places, the water was warm, and the trail crossed the stream several times, making this a highly accessible and heavily disturbed habitat.

Fisherman's Flat

On July 19 we approached the creek from the steep hiking trail at Fisherman's Flat (Map 5, Table 5, Sites #5, 6, 7). At the stream (N43°43.156' W103°23.856') was a rock outcrop; bank to bank width was 12 meters, and .4 meters deep. There were riffles, rubble, submerged rocks, numerous perching boulders, moderate streamside cover, and bugs present under stream rocks. The water was clear but not icy cold. We met hikers and horseback riders, traveling the stream trail west upstream from this spot.

Going east downstream, at N43°43.313' W103°23.772' was a cliff (probably 60 meters high) with large boulders, several logs and a pool. Up and downstream were riffles, white water, submerged rocks, numerous perching boulders. Streamside cover was moderate, primarily marshy grasses. The stream had many "noisy" waterfalls. A typical waterfall was .6 meters high with the stream 3 meters across and .8 meters deep by the rocks, 1.3 meters farther out. Suds were observed in the pool under the cliff.

Downstream toward the canyon gorge were several excellent sites. A typical example was at N43°43.368' W103°23.693' where there was a cliff overhang with crevices, logs, perching boulders along the stream edges, and dense streamside cover (primarily deciduous). Riffles and submerged rocks occurred up and downstream. Width was estimated at 24 meters at the pool and 4.5 meters at the waterfalls. Moss was in the stream. Downstream from that point the water was too deep and wide, the canyon walls inaccessible (except with climbing gear) and travel beyond that point was impossible. A Canyon Wren was seen and heard.

Downstream to Primitive Camp

On July 20, we hiked the creek from the east end at the primitive French camp, approached from CSP Wildlife Loop Road (Map 5, Table 5, Sites #8,9).

From the east side of the gorge/narrows, French Creek had prime dipper habitat: dense streamside cover, numerous boulders, rocks, cliff walls with crevices and ledges, rock outcroppings. The stream had fast-flowing current and cold, deep water. Stream width varied from 6 to 9 meters and was .4 to 1.5 meters (much deeper in less accessible spots). In several places streamside cover was too dense and prevented access to the creek.

The fast current and icy, deep water, white water chutes, noisy riffles, submerged rocks occurred throughout this section of creek. A typical spot, N43°43.397' W103°23.306' narrowed to 3 meters wide and 1 meter deep at edges. The site had several white water chutes, submerged rocks, much woody downfall, and numerous boulders. In this canyon, the terrain was rugged and rocky, impeding travel.

Downstream, the creek continued to have thick streamside cover, with no trail in many places; many boulders and rocks, and 1.5 meter stream crossings. At N43°43.069' W103°22.261' was another typical site: cliff and canyon walls with overhang, a pool, noisy riffles, submerged rocks 6 meters wide, .5 meters deep by the pool. A Canyon Wren was seen and heard.

At N43°43.128' W103°22.168' was another low outcrop somewhat accessible to predators. A ledge over the water had noisy riffles, submerged rocks, gravel, vegetation. Width was 5 to 6 meters, depth .4 meters above the riffles. Some perching boulders and moderate streamside cover made this a potential site.

To this point, the trail was probably inaccessible to horses and some hikers (vegetation was dense with poison ivy, oak, raspberry and grape ivy). Downstream from this spot, even though physical characteristics for nesting habitat exist, disturbance increases (Table 5 Sites #10, 11, 12).

Near the "rough camp" was a lowhead dam and pool with a cliff overhang on one side of the pool, riffles up and downstream, gravel, submerged rock, vegetation, moderate

streamside cover, and bugs under rocks (N43°43.002' W103°22.055').). Recreational use, however, makes this habitat highly disturbed and accessible.

At N43°42.917' W103°22.043' where the trail crosses the stream, an 8 centimeter pipe was across the creek. A few feet upstream was a cliff overhang, large boulders with noisy riffles on either side, submerged rocks, and some silt apparent on rocks, and a few perching boulders on the edges. There was sparse downfall and heavy streamside cover. At a pool, stream width was 6 meters, depth .5 meters. Water ran clear and food was present under rocks. Downstream the creek runs dry. A third canyon wren was seen and heard.

Secondary Creeks

Spring Creek

On July 21 we surveyed sections of Spring Creek from Hill City to Lake Sheridan on 385 and east out of Lake Sheridan along C 228 until the creek flowed away from the road to the south, before Victoria Gulch (Map 6, Table 6) The creek at N43°59.033' W103°25.868' was 6 meters wide, bank to bank and varied from .16 to .3 meters deep at the edge, with some quiet riffles, gravel, rubble and a few small perching boulders upstream. Downstream was a rock outcrop with sparse streamside cover, some foam noticeable in the stream, but in general, clear shallow water with many riffles. Some bugs were present. This creek was highly accessible as it wound along paved C 228. Several bridges might be marginal nest sites.

In November, 2001, at N43°59.25' W103°20.10' a geologist and Foster Sawyer, South Dakota Department of Natural Resources, hiked 7 miles along Spring Creek through private property from just east of the Stratosphere Bowl to the Reptile Gardens. They observed two dippers (possibly a mature and immature) near a spring, unmarked on US Forest Service Black Hills maps.

Grace Coolidge Creek

On several dates, July 17 through July 20 in Custer State Park, we drove along Grace Coolidge Creek on Wildlife Loop Road from the Grace Coolidge campground to the State Game Lodge. The stream meandered as a narrow trickle along most of the road. We did not survey the walk-in fishing area of the creek north of Grace Coolidge Campground. At least six lowhead dams have been constructed, slowing water flow. The majority of this creek, if not all of it, has unsuitable habitat for dippers.

Squaw Creek

We chose to survey Squaw Creek because both researchers had seen dipper and dipper nests on the creek several years ago, and Squaw is a tributary of Spearfish. Backlund's survey in 2001 showed an increase in numbers on Spearfish Creek: 28 dippers, only 15 active nests. We thought dippers might have dispersed into Squaw Creek, and later in the summer, 2001, a dipper was seen along Squaw Creek.

We hiked Squaw from its confluence with Spearfish to a point beyond N44°23.684' W 103°53.106' where the creek flows through narrow cliff walls converging to an opening too narrow to navigate (Map 7, Table 7).

At N44°23.948' W103°53.524' we located a nest 1.52 meters above the water on a limestone ledge/outcropping. Lining was still in the nest. The stream was 5 meters across and .2 meters deep with rubble, submerged rocks, riffles and numerous perching boulders both up and downstream. Tiny fish were observed, as well as some larvae. Water was clear and flowing freely. A hiking trail follows the creek, so the area has heavy traffic and disturbance.

The entire creek had several glides and riffles, rubble substrate, numerous perching boulders and little woody downfall. In several places, limestone cliff edges provide ledges and crevices for nests. The stream varied from 5 to 9 meters wide and averaged approximately .2 meters deep. Upstream from the Devil's bathtub area (N44°23.806' W103°53.384') with its white water chutes and limestone cliffs, the trail is more difficult to travel and may experience less traffic.

Downstream from N44°23.684' W103°53.106' a nest was found on the north side of the limestone wall, 1.25 meters above the water (Canyon walls prevented a GPS reading at the exact nest site.) Downstream from the nest, the water flows through chutes created by the narrowing rock/canyon walls. The stream flows over a continuous rock surface about 8 meters wide and 1.5 meters deep. There were numerous submerged rocks, perching boulders, ledges, some downfall, and heavy streamside cover. A rough hiking trail followed the creek.

Squaw Creek has physical characteristics which make it ideal dipper habitat if human traffic and water quality can be controlled.

Questions Raised By the Survey

Several questions about the future viability of dippers in the Black Hills are raised by our findings.

Dispersal patterns for dippers in the Black Hills (Map 8)

Spearfish Creek and its tributaries appear to be the sole breeding habitat/source population area in the entire Black Hills. Map 8 shows a close proximity of the headwaters for six creeks in the northern hills. Suitable nesting sites exist on all creeks we surveyed, but the waterways do not provide continuous habitat for survival.

- 1) Where do dippers disperse after fledging? Do they disperse to other creeks from headwaters to headwaters?
- 2) Where do they spend winter? Are downstream springs viable wintering habitat?
- 3) What is the overwintering survival rate? What mechanisms do dippers use for winter survival since they are active all winter?
- 4) Can dippers travel across degraded or poor sections of streams to reach suitable nesting, foraging, and wintering habitat?
- 5) How often does dispersal between watersheds occur? Does dispersal occur more frequently when dipper numbers in source populations are high?
- 6) Are all the streams outside the Spearfish Canyon watershed, in effect, population sinks as opposed to source areas for replenishing the population? (Osborn, 1999) Do dippers disperse into marginal habitat and then die because of conditions?

Restoration of dipper habitat

Where sections of stream with suitable habitat are adjacent to recreational, residential, mining or logging uses, prime dipper habitat is fragmented. In addition, the presence of humans has negatively impacted water quality and streamside cover.

- 1) Can habitat be restored so that a viable population of dippers is sustainable in the Black Hills?
- 2) Can sections of creeks not degraded by human interference be maintained and improved so that dippers can be returned to these areas?

Awareness of Unique Status of American Dipper for the Black Hills

The dipper is not listed as a Region 2 sensitive species occurring or potentially occurring in the Black Hills because the Hills are part of the Rocky Mountain region, and the dipper

is not threatened in the greater Rocky Mountains.* However, the Black Hills harbors many disjuncts such as the dipper that may be common elsewhere.

- 1) How important is it to preserve the American Dipper in the Black Hills?
- 2) Is it appropriate to create a Black Hills sensitive species list, and place the American Dipper on it, thereby improving our ability to protect the species?
- 3) Can awareness and communication about the American Dipper in the Black Hills be developed through a website maintained by the Natural Heritage Program? The website could provide contact and networking information, inviting people to report sightings, nests, and other pertinent information.

* Black Hills National Forest Land and Resource Management Plan Amendment, October, 2000 does not list the American Dipper as a sensitive species.

Water Quality in the Black Hills

Finally, the larger questions of water quality and human interference raises several questions. The presence of dippers indicates the existence of healthy streams:

- 1) Is water quality in Black Hills streams in jeopardy, and more importantly, can that be changed?
- 2) Can a workable compromise be achieved so that dippers and humans can co-exist?
- 3) What can be done to manage flow out of Pactola and Stockade Lake to make it beneficial for dippers?
- 4) What can be done to encourage visitors to be protective of water quality in our creeks?

Acknowledgments

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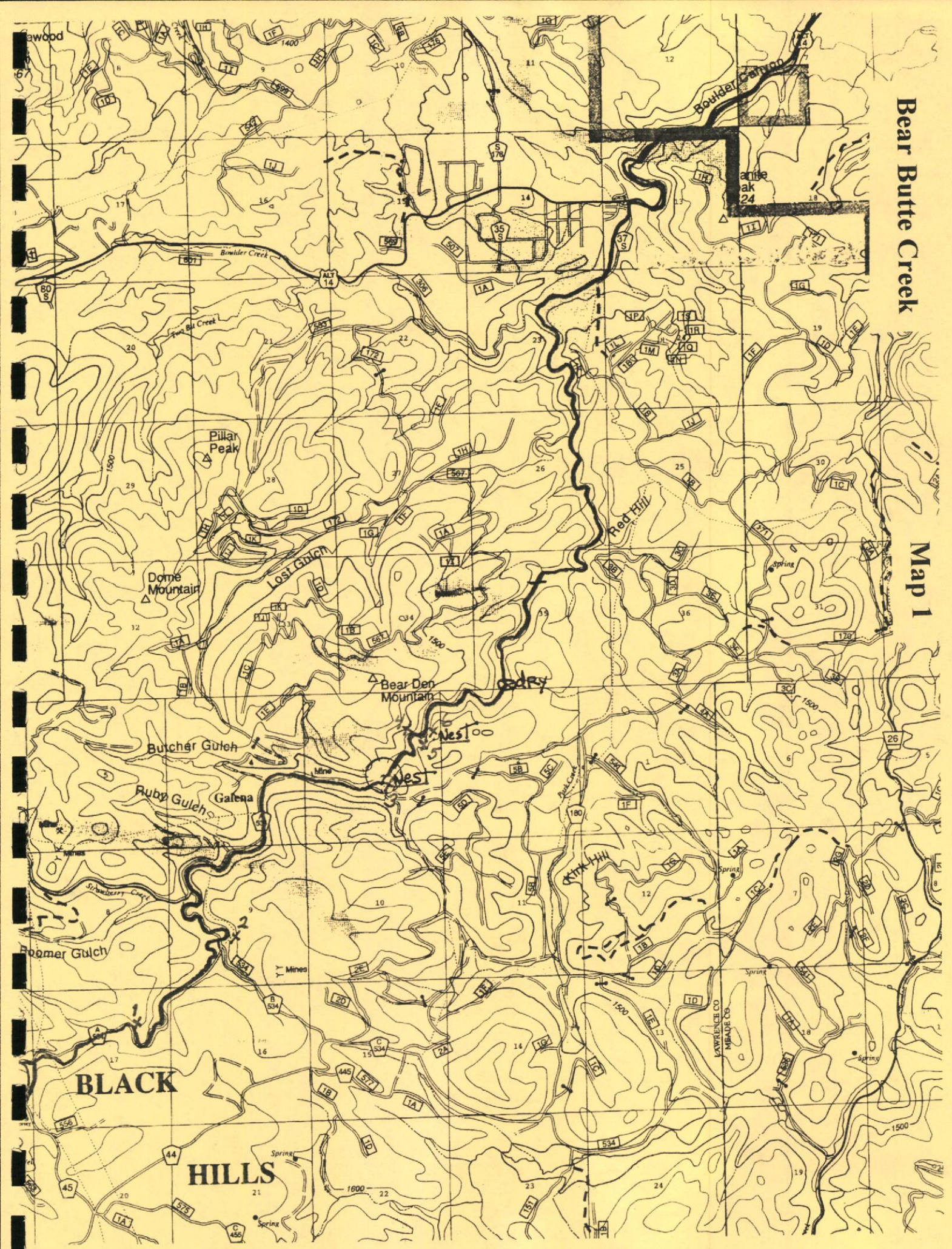
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Appendices

- A. Maps and Tables
- B. Data Sheet
- C. Birds Observed on Transects

Bear Butte Creek

Map 1



American Dipper (*Cinclus mexicanus*) Survey
in the Black Hills, SD.
July, 2001

Bear Butte Creek

[illegible]

Elk Creek

Map 2

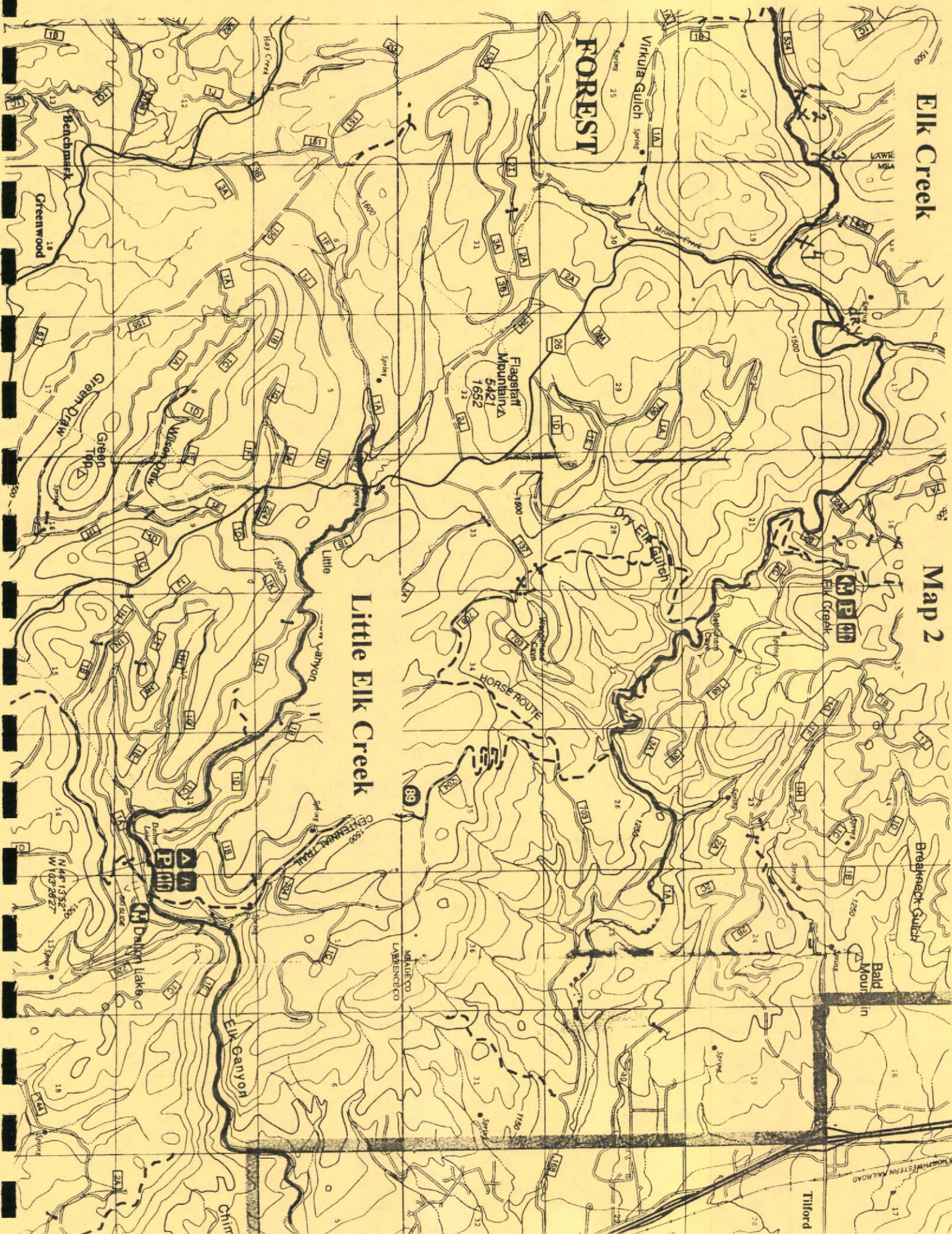


Table 2

American Dipper (*Cinclus mexicanus*) Survey
in the Black Hills, SD.
July, 2001

Data compilation
Dipper sightings, nests, and potential nest sites

Elk Creek

Site #	Site Coordinates	Description	Nest site type	Stream		Flow speed (1-5 scale)	Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				Stream width meters	depth at center meters						
1	N44°17.882' W103°34.903'	Historic range, potential nest site	Large boulder	4	1	1	Submerged rocks	Few	Moderate	Yes	Natural, no road
2	N44°17.814' W103°34.846'	No nest site, good forage area		5	.2	3	Submerged rocks	Numerous	Moderate	Yes	Natural. Trail
3	N44°17.935' W103°34.424'		Cliff overhang, large boulders	5	.2	3-4	Submerged rocks	Numerous	Heavy		Natural, rough trail
4	N44°17.87' W103°33.805'	Good nest site	Cliff overhang			1-3	mud/silt		Sparse		Ag, grazing, trail

Map 3

Boxelder Creek



Table 3

American Dipper (*Cinclus mexicanus*) Survey
in the Black Hills, SD.
July, 2001

Data compilation
Dipper sightings, nests, and potential nest sites

Boxelder Creek

Site #	Site Coordinates	Description	Nest site type	Stream		Flow speed (1-5 scale)	Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				Stream width meters	depth at center meters						
1	N44°11.832' W103°31.358'	Historic range Cliff overhang		6		2-3	Rubble, submerged rocks	Numerous	Moderate	Little	Natural, gravel road
2	N44°11.682' W103°31.302'	Historic range Cliff overhang		5	4	3-4	Rubble, submerged rocks	Numerous	Heavy	Little	Natural, gravel road
3	N44°11.551' W103°31.089'	Historic range Bridge		2	.25	3	Rubble, submerged rock	Some	Moderate	Yes	Natural, Centennial Trail
4	N44°09.530' W103°28.222'	Good nest site	Large boulders	9	1.5	1-3	Rubble, gravel, some silt	Some	sparse	Yes	Camping, streamside trails

Rapid Creek:
Rhoads Fork to Rochford

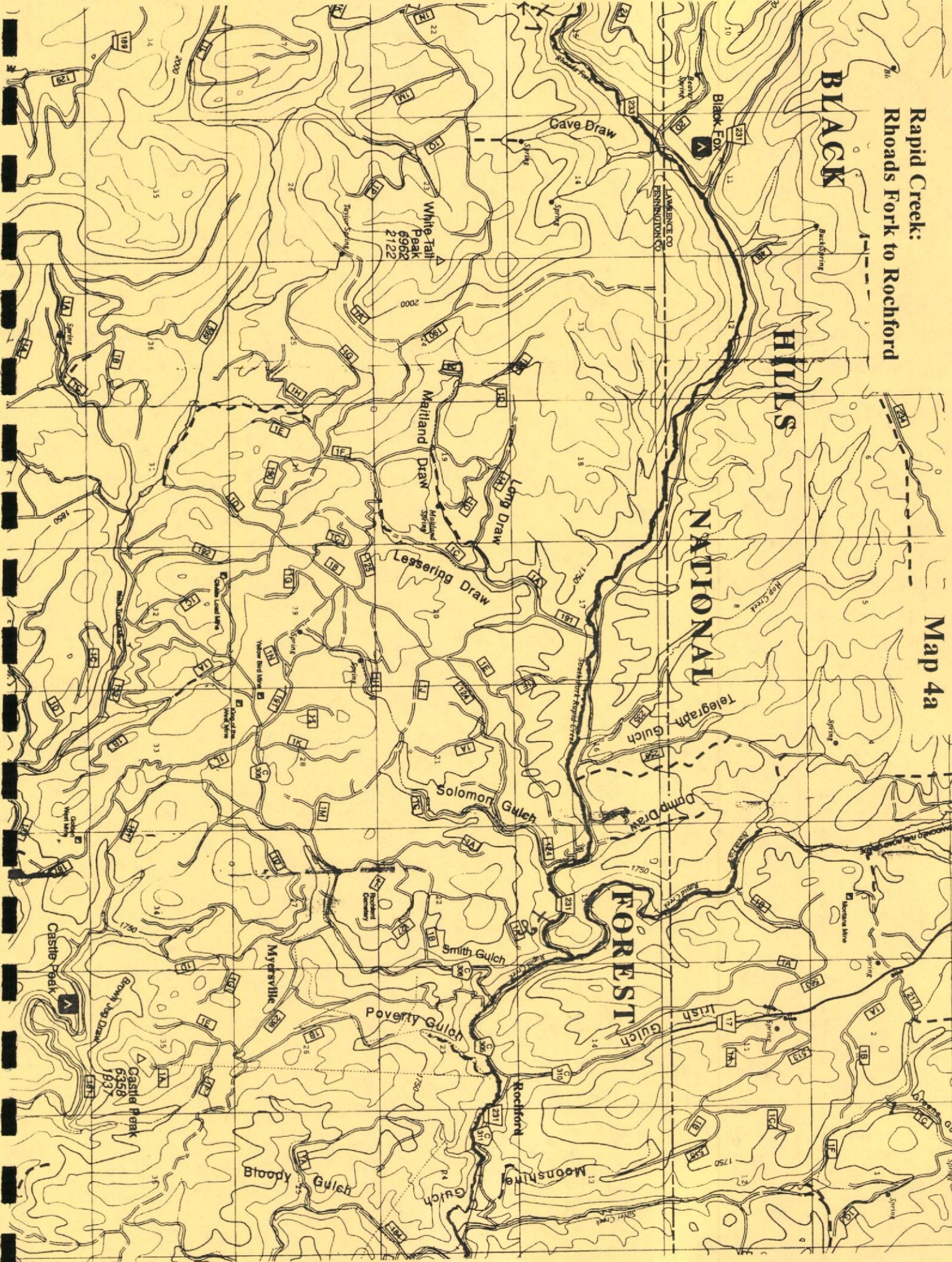
BLACK

HILLS

NATIONAL

FOREST

Map 4a



Rapid Creek :
Rochford to Silver City

Map 4b



Rapid Creek :
Silver City to Johnson

Map 4c



Rapid Creek: Johnson to Rapid City

Map 4d

ACK-HILLS
ONAL FOREST

NATIONAL FOREST

BLACK HILLS



Map Le

- Paved Road
- Improved Road
- Unimproved Road
- Improved Trail
- Unimproved Trail
- Centennial Trail

- Campground, Picnic Area
- Ranger Station, Visitor Center
- Trailhead, Interpretive Point of Interest, View Area
- Parking, Handicap Access
- Restrooms, Telephone
- Amphitheater, Boal Ram Gate
- Interstate Highway
- US Highway
- State or Local Highway
- Forest Road
- National Forest Boundary
- Special Area Boundary
- Wooded Cover
- Private Land
- Intermittent Streams

CONVERSION TABLE

Meters	Feet
1	3.2808
2	6.5617
3	9.8425
4	13.1234
5	16.4042



Table 4

American Dipper (*Cinclus mexicanus*) Survey
in the Black Hills, SD.
July, 2001

Data compilation
Dipper sightings, nests, and potential nest sites

Rapid Creek

Site #	Site Coordinates	Description	Nest site type	Stream		Flow speed (1-5 scale)	Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				Stream width meters	depth at center meters						
1	N44°07.878' W103°52.093'	Historic Range	Foraging only	3	0.25	3	Gravel	None	Moderate	No	Natural, road
2	N44°07.715' W103°44.270'	Historic Range	Large boulders	6	0.2	3-4	Rubble, silt, submerged rocks	Few	Moderate	No	Cabins, roads
3	N44°06.418' W103°38.949'	Good nest site	Waterfall, rocky edges	8	0.5	5	Gravel	Few	Moderate	Scarce	Cabins, trail
4	N44°06.243' W103°38.486'	Historic Range	Bridge	6	0.2	3-4	submerged rocks, silt	None	Heavy	Scarce	Cabins, trail
5	N44°04.886' W103°35.280'	Historic Range	Foraging only	6	0.2	3-4	Rubble, submerged rocks	Few	Moderate	?	Natural, trail
6	N44°04.640' W103°28.306'	Good nest site	Bridge piling	15	1	1-2	Gravel, rubble, submerged rocks	None	Moderate	Some	Natural, trail
7	N44°04.670' W103°28.040'	Good nest site	Cliff overhang	12	.5-2.0	1	Rubble, submerged rocks	None	Moderate	Some	Natural, trail
8	N44°04.904' W103°26.418'	Historic range	Bridge	12	.2-.5	3	Silt, rubble, submerged rocks	Some	Sparse	No	Housing, gravel road
9	N44°04.828' W103°26.360'	Good nest site	Crevice	8	0.5	4	Submerged rocks, silt at edges	Few	Moderate	No	Housing, gravel road

Site #	Site Coordinates	Description	Nest site type	Stream			Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				Stream width	depth at center	Flow speed (1-5 scale)					
10	N44°03.309' W103°25.042'	Recent report	Bridge, nest box	8	0.6	4	Rubble, submerged rocks	Few	Heavy	No	Housing, paved road
11	N44°03.539' W103°24.862'	Nest, recent report	Waterfall	15	.2-10	1-3	Rubble	Few	Moderate	Yes	Tourist site, paved road
12	N44°03.291' W103°24.299'	Historic range	Cliff overhang	11	1	4	Submerged rocks	Few	Heavy	Some	Housing, gravel road
13	N44°02.780' W103°23.340'	good nest site	Bridge	11	0.5	4-5	Submerged rocks	Numerous	Heavy	Yes	Natural, old forest rd.
14	N44°02.794' W103°22.392'	good nest site	Bridge	12	0.5	3	Submerged rocks	Numerous	Moderate	Yes	Natural, gravel forest rd.
15	N44°02.667' W103°22.225'	Good nest site	Cliff overhang	12	1	3-5	Rubble, submerged rocks	Numerous	Heavy	Yes	Natural, trail
16	N44°02.713' W103°22.172'	Good nest site	Cliff overhang, large boulders	15	?	3-5	Rubble, submerged rocks	Numerous	Heavy	Yes	Natural, old forest rd.

French Creek

Map 5



Table 5

American Dipper (*Cinclus mexicanus*) Survey
in the Black Hills, SD.
July, 2001

Data compilation
Dipper sightings, nests, and potential nest sites

French Creek

Site #	Site Coordinates	Description	Nest site type	Stream		Flow speed (1-5 scale)	Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				width meters	depth at center meters						
1	N43°43.408' W103°26.733'	Good nest site	Rock outcropping	8	3-5 pool	1-2	Sand, silt	None	Sparse	Little	Heavily used horse trail
2	43°43.513' W103°26.609'	Good nest site	Rock outcropping	6	.4	2-3	Submerged rocks	Few	Sparse	Yes	Horse trail
3	N43°43.634' W103°26.380'	Historic range	Cliff overhang, rock crevice Needle-like rock	5	.3	1-2	Submerged rocks, silt at pool	Few	Sparse	Yes	Horse trail
4	N43°43.613' W103°26.279'	Good nest site	outcropping, cliff overhang	5	.2	1-3	Submerged rocks	Few	Moderate	Yes	Natural, trail
5	N43°43.156' W103°23.856'	Good nest site	Rock outcropping	12	3-4	1-2	Submerged rocks	Few	Moderate	Yes	Natural, trail
6	N43°43.313' W103°23.772'	Good nest site	Cliff overhang, Large boulders	3	.5	1, 3, 5	Rubble, submerged rocks	Numerous	Moderate	Yes	Natural, trail
7	N43°43.368' W103°23.693'	Good nest site	Cliff overhang, ledge	24 at pool	2-4	1	Submerged rocks	Few	Heavy	Yes	Natural
8	N43°43.397' W103°23.306'	Good nest site	Large boulders	3.0	1.0	5	submerged rocks	Numerous	Heavy	Yes	Natural

Site #	Site Coordinates	Description	Nest site type	Stream		Flow speed (1-5 scale)	Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				width	depth at center						
9	N43°43.401' W103°23.242'	Good nest site	Cliff overhang, large boulders	9	1.5	1, 3	Submerged rocks	Numerous	Heavy	Yes	Natural
10	N43°43.069' W103°22.261'	Good nest site	Cliff overhang	6	.4	1-3	Gravel, submerged rocks, silt at pool	Numerous	Moderate	Yes	Natural, trail
11	N43°43.002' W103°22.055'	Good nest site	Cliff overhang	6	.4	1-3	Gravel, rubble, silt at pool	Few	Moderate	Yes	Natural, trail
12	N43°42.917' W103°22.043'	Good nest site	Cliff overhang	6	.5	1, 3	Gravel, submerged rocks, silt at pool	Few	Heavy	Yes	Natural, trail

Spring Creek

Map 6

BLACK HILLS

NATIONAL FOREST



CONVERSION 1

Meters	
1	3.28
2	6.56
3	9.84
4	13.12
5	16.40
6	19.68
7	22.96
8	26.24
9	29.52
10	32.80

To convert meters multiply by 3.2808
To convert feet to meters multiply by 0.3048
To convert miles to multiply by 1.609

Table 6

American Dipper (*Cinclus mexicanus*) Survey
in the Black Hills, SD.
July, 2001

Data compilation
Dipper sightings, nests, and potential nest sites

Spring Creek

Site #	Site Coordinates	Description	Nest site type	Stream		Flow speed (1-5 scale)	Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				width meters	depth at center meters						
1	N43°59.033' W103°25.868'	Good nest site	Rock outcrop	6	0.2	3	Gravel, rubble	Few upstream	Sparse	Yes	Sparse development, road
2	N43°59.116' W103°25.5'	Good nest site	Rock outcrop	6	0.2	3	Gravel, rubble	Few	Sparse	Yes	Sparse development, road
3	N43°59.25' W103°20.10'	Dippers observed	Foraging	Spring	*	*	*	*	*	*	*

* See text for explanation

Squaw Creek

Map 7



Table 7

American Dipper (*Cinclus mexicanus*) Survey
in the Black Hills, SD.
July, 2001

Data compilation
Dipper sightings, nests, and potential nest sites

Squaw Creek

Site #	Site Coordinates	Description	Nest site type	Stream		Flow speed (1-5 scale)	Substrate	Perching rocks	Streamside cover	Food present	Surrounding land use
				Stream width meters	depth at center meters						
1	N44°23.948' W103°53.524'	Nest	Cliff overhang	5	.2	3	Rubble, submerged rocks	Numerous	Moderate	Scarce	Natural, trail
2	N44°23.889' W103°53.543'	Good nest site	Cliff overhang	9	0.2	2-3	Rubble	Numerous	Moderate	Scarce	Natural, trail
3	N44°23.806' W103°53.384'	Good nest site	Cliff overhang	5	0.4	1	Rubble, submerged rocks	Numerous	Moderate	Scarce	Natural, trail
4	N44°23.801 W103°53.368'	Good nest site	Cliff overhang	4	0.2	1	Rubble	Numerous	Moderate	Some	Natural, trail
5	N44°23.668' W103°53.120'	Good nest site	Cliff overhang	8	.5	1 + 3	Rubble	Numerous	Moderate	Some	Natural, trail
6	N44°23.684' W103°53.106'	Nest	Cliff overhang	8	1.5	1 + 3	Submerged rocks	Numerous	Heavy	Some	Natural, trail

Zone

Bear Butte Creek



Appendix B

American Dipper (*Cinclus Mexicanus*) DATA SHEET

Date _____ AM PM

Creek _____ GPS location _____ Map location _____

Reason for recording data (circle):

Dipper(s) sighted _____ Nest _____ Historic range _____ Recent report _____ Good nest site _____
 Other _____

Stream characteristics:

Width (meters)

Bank to Bank: 1 2 3 4 5 6 7 8 _____ Meters

Current water width: 1 2 3 4 5 6 7 8 _____ Meters

Depth at center (centimeters): _____ cm stream pool

Flow speed: 1 2 3 4 5
 (pool) (glides) (riffles, no standing water) (white water, standing waves) (raging white water, chutes)

Substrate:

Bottom: mud/silt sand gravel rubble submerged rocks vegetation
 (pebbles 2-20 cm) (20 cm +) (growing)

Perching boulders (emergent): none few numerous

Downfalls (woody debris): zero <5 5-10 >10

Streamside cover: sparse (<10%) moderate (10%-50%) heavy (>50%) deciduous coniferous

Food (aquatic invertebrates): present absent

Nest site (available nest substrate: inaccessible ledge, usually over water):

cliff overhang large boulders bridge crevice log other _____

Development: yes no **Road:** paved gravel 2-track trail none

Land use: natural housing agriculture grazing roads logging other _____

Notes:

Appendix C

Bird species observed on transects

July, 2001

Listed according to South Dakota Birdlist (SDOU):

Great Blue Heron
Turkey Vulture
Osprey
Cooper's Hawk
Red-tailed Hawk
American Kestrel
Wild Turkey
Spotted Sandpiper
Upland Sandpiper
White-throated Swift
Belted Kingfisher
Red-headed Woodpecker
Red-naped Sapsucker
Hairy Woodpecker
Northern Flicker
Western Wood Pewee
Cordilleran Flycatcher
Plumbeous Vireo
Blue-headed Vireo
Red-eyed Vireo
Blue Jay
American Crow
Violet-green Swallow
Cliff Swallow
Black-capped Chickadee
White-breasted Nuthatch
Canyon Wren

American Dipper
Eastern Bluebird
Mountain Bluebird
Townsend's Solitaire
Veery
Swainson's Thrush
American Robin
Gray Catbird
Brown Thrasher
Yellow Warbler
Yellow-rumped Warbler
American Redstart
Ovenbird
Northern Waterthrush
Common Yellowthroat
Western Tanager
Spotted Towhee
Chipping Sparrow
Lark Sparrow
Song Sparrow
Dark-eyed Junco
Black-headed Grosbeak
Red-winged Blackbird
Western Meadowlark
Red Crossbill
Evening Grosbeak

